

4.14

Logarithmic Functions & Solving

Name _____ Date _____ Period _____

Rewrite each of the equations in logarithmic form.

1. $2^8 = 256$

2. $3^{-3} = \frac{1}{27}$

3. $\left(\frac{1}{5}\right)^4 = \frac{1}{625}$

4. $4^2 = 16$

5. $10^2 = 100$

6. $e^0 = 1$

7. $4^{-3} = \frac{1}{64}$

8. $\left(\frac{12}{15}\right)^2 = \frac{144}{225}$

9. $\left(\frac{2}{3}\right)^2 = \frac{4}{9}$

Rewrite each of the equations in exponential form.

10. $\log_2 8 = 3$

11. $\log_8 4 = \frac{2}{3}$

12. $\ln 10 = x$

13. $\log 0.001 = -3$

14. $\log_3 \frac{1}{81} = -4$

15. $\log_7 7 = 1$

Evaluate the logarithmic expression without using a calculator. Show work!

16. $\log_4 4$

17. $\log_6 1$

18. $\log_2 32$

19. $\log_3 81$

20. $\log_5 \sqrt[3]{25}$

21. $\log_6 \frac{1}{\sqrt[3]{36}}$

22. $\log 10^3$

23. $\log 10,000$

24. $\log 100,000$

25. $\log 10^{-4}$

26. $\log \sqrt[3]{10}$

27. $\log \frac{1}{\sqrt{1000}}$

28. $\ln e^3$

29. $\ln e^{-4}$

30. $\ln \frac{1}{e}$

31. $\ln 1$

32. $\ln \sqrt[4]{e}$

33. $\ln \frac{1}{\sqrt{e^7}}$

Evaluate the expression without using a calculator. (Use the basic properties.)

34. $7^{\log_7 3}$

35. $5^{\log_5 8}$

36. $10^{\log(0.5)}$

37. $10^{\log 14}$

38. $e^{\ln 6}$

39. $e^{\ln\left(\frac{1}{5}\right)}$

Use a calculator to evaluate the logarithmic expression if it is defined, and check your result by evaluating the corresponding exponential expression. Round to nearest the ten thousandths.

40. $\log 9.43$

41. $\log(-14)$

42. $\ln 4.05$

43. $\ln(-0.49)$

Solve the following equations. **MUST SHOW YOUR WORK!!!!!! No decimal answers.**

44. $\log_3 x = 2$

45. $\log_5 x = 3$

46. $\log_2 x = 5$

47. $\log_3 27 = x$

48. $\log_x 49 = 2$

49. $\log_3 \sqrt{3} = z$

50. $\log_{25} x = \frac{3}{2}$

51. $\log_x \frac{1}{100} = -2$

52. $\log_{\frac{1}{10}} x = -3$

$$53. \log_{3x} 125 = 3$$

$$54. \log_2(2x + 1) = 3$$

$$55. \log_3(3x - 2) = 2$$

$$56. \log_x 4 = 2$$

$$57. \log_{3x} \left(\frac{1}{8} \right) = 3$$

$$58. \log_4 64 = x$$

$$59. \log_4 x = 8$$

$$60. \log_3 243 = 2x + 1$$

$$61. \log_3(4x - 7) = 2$$

$$62. \log_{32}(x - 1) = 1$$

$$63. \log_3 x = \frac{1}{9}$$

$$64. \log_5 x = 0$$

$$65. \log_3 x = -5$$

$$66. \log_x 196 = 2$$

$$67. \log_{25} \left(\frac{x}{2} \right) = \frac{1}{2}$$

$$68. \log_5 125 = 8x - 3$$

$$69. \log_4 256 = -3x + 1$$

$$70. \log_2 128 = -2x - 5$$